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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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James Wilson Rose

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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
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NISKAYUNA, NY 12309

EXAMINER

LEE, SHUN K

ART UNIT

PAPER NUMBER

2884

DATE MAILED: 03/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

EJC

Office Action Summary	Application No. 10/815,357	Applicant(s) ROSE ET AL.	
	Examiner Shun Lee	Art Unit 2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Objections

1. Claims 1, 3-5, 19, and 21 are objected to because of the following informalities:
 - (a) in claim 1, "the X-ray detection device" on line 10 should probably be --said at least one X-ray detecting media--;
 - (b) in claim 3, "the X-ray detecting media" on lines 1-2 should probably be --said at least one X-ray detecting media--;
 - (c) "guided optics" on line 2 in claim 4 should probably be --a plurality of guided optics-- and correspondingly "a plurality of optical fibers-- on lines 1-2 in claim 5 should probably be --said plurality of guided optics-- (*i.e.*, cooperative relationships of elements should be positively recited);
 - (d) in claim 19, "the X-ray detection device" on line 9 should probably be --said at least one X-ray detecting media--; and
 - (e) in claim 21, "the optical detector" on line 3 should probably be --said optical transmission conduit-- (see Fig. 2).

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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3. Claims 1-4, 6, 12-14, 17-21, 23, and 24 are rejected under 35 U.S.C. 102(a) as being anticipated by Ruzga (US 6,710,350).

In regard to claims **1** and **19**, Ruzga discloses (Figs. 1-6) a radiation imaging system (10) such as a computer tomography (CT) system (10) for generating an image of an object (18), the imaging system (10) comprising:

- (a) an X-ray source (12) disposed in a spatial relationship to the object (18) configured to transmit X-ray radiation (14) through the object (18);
 - (b) at least one X-ray detecting media (22) configured to convert the X-ray radiation (14) transmitted through the object (18) to optical signals;
 - (c) an optical transmission conduit (66, 90) comprising a first end and a second end; and
 - (d) an optical detector (67) configured to convert optical signals to corresponding electrical signals; and
- wherein the first end of the optical transmission conduit (66, 90) is coupled to the X-ray detection device (22) and the second end is coupled to the optical detector (67).

In regard to claim **2** (which is dependent on claim 1) and claim **23** (which is dependent on claim 19), Ruzga also discloses (Figs. 1-6) an image processor (36, 38, 40) coupled to the optical detector (67) and configured for processing the electrical signals to generate the image.

In regard to claim **3** which is dependent on claim 2, Ruzga also discloses (Figs. 1-6) that the X-ray detecting media (22) comprises a plurality of scintillators.

In regard to claim **4** (which is dependent on claim 3) and claim **24** (which is dependent on claim 19), Ruzga also discloses (Figs. 1-6) that the optical transmission conduit (66, 90) comprises guided optics.

In regard to claim **6** which is dependent on claim 1, Ruzga also discloses (Figs. 1-6) a modulator (52, 78) configured for modulating the optical signals.

In regard to claim **12** which is dependent on claim 1, Ruzga also discloses (Figs. 1-6) an optical coupling mechanism (62, 86) configured to enhance a coupling efficiency and for directing the optical signals through the optical transmission conduit (66, 90).

In regard to claims **13** and **14**, Ruzga discloses (Figs. 1-6) an method for generating an image of an object, the method comprising:

- (a) transmitting X-ray radiation (14) through the object (18) at a predetermined location;
- (b) converting the X-ray radiation (14) transmitted through the object (18) to optical signals (by using at least one X-ray detecting media 22);
- (c) providing an optical transmission (conduit or) path (66, 90) for optical signals to an optical detector (67);
- (d) converting the optical signals to corresponding electrical signals (by using the optical detector 67); and
- (e) processing the electrical signals to generate the image (by using an image processor 36, 38, 40).

Applicant is advised that should claim 13 be found allowable, claim 14 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two

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claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

In regard to claim **17** which is dependent on claim 14, Ruzga also discloses (Figs. 1-6) that the step of providing the optical transmission path (66, 90) further comprises modulating the optical signals (by using a modulator 52, 78).

In regard to claim **18** which is dependent on claim 13, Ruzga also discloses (Figs. 1-6) directing the optical signals through the optical transmission path (66, 90).

In regard to claim **20** which is dependent on claim 19, Ruzga also discloses (Figs. 1-6) that the X-ray source (12) and the at least one X-ray detecting media (22) are disposed on a gantry assembly (24) of the CT system (10), wherein the gantry assembly (24) is configured to rotate about the object (18) being imaged.

In regard to and claim **21** which is dependent on claim 20, Ruzga also discloses (Figs. 1-6) an optical coupling mechanism (62, 86) configured to couple the optical signals generated by the X-ray detecting media (22) disposed on the gantry assembly (24) to the optical detector (67).

4. Claims 1-5, 13-16, 19-21, and 23-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Karellas (US 5,465,284).

In regard to claims **1** and **19**, Karellas discloses (Figs. 1-6) a radiation imaging system such as a computer tomography (CT) system for generating an image of an object (16), the imaging system comprising:

- (a) an X-ray source (12, 40) disposed in a spatial relationship to the object (16) configured to transmit X-ray radiation (14) through the object (16);
 - (b) at least one X-ray detecting media (20, 48) configured to convert the X-ray radiation (14) transmitted through the object (16) to optical signals;
 - (c) an optical transmission conduit (26, 44) comprising a first end and a second end; and
 - (d) an optical detector (24) configured to convert optical signals to corresponding electrical signals; and
- wherein the first end of the optical transmission conduit (26, 44) is coupled to the X-ray detection device (20, 48) and the second end is coupled to the optical detector (24).

In regard to claim **2** (which is dependent on claim 1) and claim **23** (which is dependent on claim 19), Karellas also discloses (Figs. 1-6) an image processor (32, 34) coupled to the optical detector (24) and configured for processing the electrical signals to generate the image.

In regard to claim **3** which is dependent on claim 2, Karellas also discloses (Figs. 1-6) that the X-ray detecting media (20, 48) comprises a plurality of scintillators.

In regard to claim **4** (which is dependent on claim 3) and claim **24** (which is dependent on claim 19), Karellas also discloses (Figs. 1-6) that the optical transmission conduit (26, 44) comprises guided optics.

In regard to claim **5** which is dependent on claim 4, Karellas also discloses (Figs. 1-6) that each one of a plurality of optical fibers (26, 44) is coupled to a corresponding one of the plurality of scintillators (20, 48).

In regard to claims **13** and **14**, Karellas discloses (Figs. 1-6) an method for generating an image of an object, the method comprising:

- (a) transmitting X-ray radiation (14) through the object (16) at a predetermined location;
- (b) converting the X-ray radiation (14) transmitted through the object (16) to optical signals (by using at least one X-ray detecting media 20, 48);
- (c) providing an optical transmission (conduit or) path (26, 44) for optical signals to an optical detector (24);
- (d) converting the optical signals to corresponding electrical signals (by using the optical detector 24); and
- (e) processing the electrical signals to generate the image (by using an image processor 32, 34).

Applicant is advised that should claim 13 be found allowable, claim 14 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

In regard to claim **15** which is dependent on claim 14, Karellas also discloses (Figs. 1-6) that the step of providing the optical transmission path (26, 44) comprises using a plurality of optical fibers and optical waveguides.

In regard to claim **16** (which is dependent on claim 14) and claim **25** (which is dependent on claim 19), Karellas also discloses (Figs. 1-6) that the optical transmission path comprises a plurality of free-space optics (e.g., lens 22 and/or mirror 52).

In regard to claim **20** which is dependent on claim 19, Karellas also discloses (Figs. 1-6) that the X-ray source (12, 40) and the at least one X-ray detecting media (20, 48) are disposed on a gantry assembly (*i.e.*, a means to rotate the source and detector assembly relative to the object; column 16, lines 38-44) of the CT system, wherein the gantry assembly is configured to rotate about the object (16) being imaged.

In regard to and claim **21** which is dependent on claim 20, Karellas also discloses (Figs. 1-6) an optical coupling mechanism (22, 52) configured to couple the optical signals generated by the X-ray detecting media (20, 48) disposed on the gantry assembly to the optical detector (24).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

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the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruzga (US 6,710,350) in view of Gross *et al.* (US 6,310,352).

In regard to claims **6-9** which are dependent on claim 1, the system of Ruzga lacks a modulator configured for modulating the optical signals, wherein the modulator comprises an optical amplifier configured to change an amplification factor of the optical signals and operated in a continuous wave mode or a pulse-sampling mode.

Gross *et al.* teach (column 3, lines 10-56) to provide an optical amplifier, in order to transmitted the optical signal over long distances. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide an optical amplifier pumped by either a CW or pulsed laser in the system of Ruzga, in order to transmitted the optical signal over long distances.

8. Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karellas (US 5,465,284) in view of Gross *et al.* (US 6,310,352).

In regard to claims **6-9** which are dependent on claim 1, the system of Karellas lacks a modulator configured for modulating the optical signals, wherein the modulator comprises an optical amplifier configured to change an amplification factor of the optical

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signals and operated in a continuous wave mode or a pulse-sampling mode.

Gross *et al.* teach (column 3, lines 10-56) to provide an optical amplifier, in order to transmitted the optical signal over long distances. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide an optical amplifier pumped by either a CW or pulsed laser in the system of Karellas, in order to transmitted the optical signal over long distances.

9. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruzga (US 6,710,350) in view of Applicant's Admitted Prior Art.

In regard to claims **10** and **11** which are dependent on claim 6, while Ruzga also discloses (column 6, lines 19-34) that a modulator can comprise of optical gating elements, the system of Ruzga lacks that the modulator comprises an optically addressed spatial light modulator which includes: a photoconductive layer configured to alter conductivity in response to a reception of light from the plurality of scintillators; a light-modulation layer configured to alter a polarization, phase or intensity factor in response to the change in conductivity of the photoconductive layer; and a sensing device configured to read the altered light-modulation layer and generate a corresponding optical signal. However, applicant admits (paragraph 31) it is well known in the art that an optically addressed spatial light modulator includes: a photoconductive layer configured to alter conductivity in response to a reception of light from the plurality of scintillators; a light-modulation layer configured to alter a polarization, phase or intensity factor in response to the change in conductivity of the photoconductive layer; and a sensing device configured to read the altered light-modulation layer and generate

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a corresponding optical signal. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a known modulator (e.g., an optically addressed spatial light modulator) for the modulator in the system of Ruzga when it is desirable that the modulator be optically controlled instead of being electrically controlled.

10. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Karellas (US 5,465,284) in view of Pandelisev (US 2002/0117625).

In regard to claim **22** which is dependent on claim 21, the system of Karellas lacks that the optical coupling mechanism comprises a micro-lens array. However, lenses are well known in the art. For example, Pandelisev teaches (paragraphs 4 and 5) that microlenses may be used to direct the emission from scintillators to detectors. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a known lens (e.g., a micro-lens array) in the system of Karellas, in order to direct the emission from scintillators to detectors.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SL


CONSTANTINE HANNAHER
PRIMARY EXAMINER